

What is claimed is:

1. A four wheel drive system comprising
a bidirectional clutch;
an actuator plate;
a primary actuating system; and
a reverse actuating device,
wherein the bidirectional clutch has first and second tubular members each having a plurality of features which define pockets containing rollers, relative rotational orientation of said tubular members being controlled by axial movement of said actuator plate, said actuator plate being moved by a combination of the primary actuating system and the reverse actuating device.
2. The system according to claim 1 wherein one of the tubular members is a roller clutch race and the second tubular member is a roller cage.
3. The system according to claim 2 wherein the actuator plate carries a pin which engages two corresponding slots rotationally fixed to the race and the cage.
4. The system according to claim 1 wherein one of the tubular members is a slipper clutch slipper and the second is an opposing race.
5. The system according to claim 4 wherein the actuator plate carries a pin which engages two corresponding slots rotationally fixed to the slipper and the opposing race.
6. A "torque-on-demand" four wheel drive system comprising:
a drag brake, and
a slipper clutch, the slipper clutch comprising:
a slipper and
an opposing race, the slipper having features engageable with the opposing race,
the engaging features being held in engagement by an axial spring
wherein the drag brake is axially actuating and actuation of the drag brake causes the engaging features to disengage.

7. A slipper clutch assembly comprising:

a slipper positioned within a bore of a rotatable component, the slipper having a first orientation wherein the slipper rotates within the bore and a second orientation wherein the slipper engages and rotates with the rotatable component, the rotatable component having tapered opposed edges; and

a pair of bearings positioned between the slipper and the rotatable component, each bearing being axially biased against a respective one of the tapered edges, such that when the slipper is in the first orientation, the bearings maintain the slipper spaced from the rotatable component and in the second orientation the bearings move axially and the slipper engages the rotatable component.

8. The clutch assembly according to claim 7 wherein the slipper clutch provides “torque-on-demand” operation for a four wheel drive system.

9. A “torque-on-demand” four wheel drive system comprising:

a slipper clutch positioned between a first rotatable component and a second rotatable component, the slipper clutch comprising:

a slipper having a first axial slot;

an opposing race having a second axial slot;

a control pin extending through and axially moveable within the first and second slots, wherein one of the first or second slots has a constant circumferential width W and the other of the first and second slots has at least first and second portions along its axial length with the first and second portions having different circumferential widths.

10. The system of claim 9 wherein the first portion has a circumferential width equal to the constant circumferential width W and the second portion has a circumferential width greater than the constant circumferential width W .

11. The system of claim 10 wherein the second portion is wider than the constant circumferential width W in both circumferential directions.

12. The system of claim 11 wherein the second slot further includes third and fourth portions along its axial length and wherein the third portion is wider than the constant

circumferential width W in one circumferential direction and the fourth portion is wider than the constant circumferential width W in the opposite circumferential direction.

13. The system of claim 9 wherein the first axial slot has the constant circumferential width W and the second axial slot has the at least first and second portions along its axial length with the first and second portions having different circumferential widths.

14. The system of claim 9 wherein the second axial slot has the constant circumferential width W and the first axial slot has the at least first and second portions along its axial length with the first and second portions having different circumferential widths.

15. A "torque-on-demand" four wheel drive system comprising:
a roller clutch positioned between a first rotatable component and a second rotatable component, the roller clutch comprising:
a race having a first axial slot;
a cage having a second axial slot and configured to receive a plurality rollers in rolling contact with the race;
a control pin extending through and axially moveable within the first and second slots, wherein one of the first or second slots has a constant circumferential width W and the other of the first and second slots has at least first and second portions along its axial length with the first and second portions having different circumferential widths.

16. The system of claim 15 wherein the first portion has a circumferential width equal to the constant circumferential width W and the second portion has a circumferential width greater than the constant circumferential width W .

17. The system of claim 16 wherein the second portion is wider than the constant circumferential width W in both circumferential directions.

18. The system of claim 17 wherein the second slot further includes third and fourth portions along its axial length and wherein the third portion is wider than the constant circumferential width W in one circumferential direction and the fourth portion is wider than the constant circumferential width W in the opposite circumferential direction.

19. The system of claim 15 wherein the first axial slot has the constant circumferntial width W and the second axial slot has the at least first and second portions along its axial length with the first and second portions having different circumferential widths.

20. The system of claim 15 wherein the second axial slot has the constant circumferntial width W and the first axial slot has the at least first and second portions along its axial length with the first and second portions having different circumferential widths.